



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Adress: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/788,414	03/01/2004	Chad A. Mirkin	083847-0235	4969
22428	7590	05/28/2008		
FOLEY AND LARDNER LLP			EXAMINER	
SUITE 500			YANG, NELSON C	
3000 K STREET NW			ART UNIT	PAPER NUMBER
WASHINGTON, DC 20007			1641	
		MAIL DATE	DELIVERY MODE	
		05/28/2008	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/788,414	Applicant(s) MIRKIN ET AL.
	Examiner Nelson Yang	Art Unit 1641

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 07 February 2008 and 07 August 2007.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-4 and 6-140 is/are pending in the application.
 4a) Of the above claim(s) See Continuation Sheet is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) See Continuation Sheet is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 01 March 2004 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No./Mail Date _____
- 4) Interview Summary (PTO-413)
 Paper No./Mail Date _____
- 5) Notice of Informal Patent Application
 6) Other: _____

Continuation of Disposition of Claims: Claims withdrawn from consideration are 3,4,6,8-13,15,16,18,20,22,28-33,42,43,45,47-51,53,54,56,58,60,66-70,73-79 and 86.

Continuation of Disposition of Claims: Claims rejected are 1,2,7,14,17,19,21,23-27,34-41,44,46,52,55,57,59,61-65,71,72,80-85,87-92,94-99,110-115 and 117-140.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of group I, claims 1-99, and 110-140 in the reply filed on February 11, 2008 is acknowledged.
2. Claims 100-109 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on February 11, 2008.
3. Claims 3, 4, 6, 8-13, 15-16, 18, 20, 22, 28-33, 42-43, 45, 47-51, 53-54, 56, 58, 60, 66-70, 73-79, 86 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on November 9, 2006.

Response to Amendment

4. Applicant's amendment of claims 1, 2, 7, 40, 46, 110-111 is acknowledged and has been entered.
5. Claims 1, 2, 7, 14, 17, 19, 21, 23-27, 34-41, 44, 46, 52, 55, 57, 59, 61-65, 71, 72, 80-85, 87-92, 94-99, 110-115, 117-140 are currently under examination.

Rejections Withdrawn

6. Applicant's arguments, see p.21, filed August 7, 2007, with respect to the double patenting rejection under 35 U.S.C. 101 have been fully considered and are persuasive. The double patenting rejection of the claims under 35 U.S.C. 101 has been withdrawn.

7. Applicant's arguments, see p.15-18, filed August 7, 2007, with respect to the rejection(s) of claim(s) 2, 7, 14, 17, 19, 21, 23-27, 34-41, 44, 46, 52, 55, 57, 59, 61-65, 71, 72, 80-85, 87-92, 94-99, 110-115, 117-140 under 35 U.S.C. 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Bernard et al. [US 2002/0098364], as discussed below.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1, 2, 7, 14, 17, 19, 21, 23-27, 34-41, 44, 46, 52, 55, 57, 59, 61-65, 71, 72, 80-85, 87-92, 94-99, 110-115, 117-140 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: the steps that would render the hydrophilic compound to inhibit protein adsorption. According to the specification, hydrophilic tips may facilitate protein adsorption (para. 0119, example 2) or control unwanted protein adsorption (para. 0095). However, claim 1 merely recites a hydrophilic tip to inhibit protein adsorption, suggesting that the hydrophilic property of the compound would inhibit protein adsorption, which does not appear to be the case according to the specification. As a result, it is unclear how the hydrophilic

compound would further be modified or what structural features it would possess to inhibit protein adsorption, or if applicant merely meant to claim a hydrophilic compound that also inhibits protein adsorption. This is also applicable to claims 40, 90, 98, 110, 111, 112.

11. With respect to claim 2, applicant recites that the compound improves reproducibility, but fails to indicate how this limitation is accomplished, rendering it unclear how one of ordinary skill in the art would be able to ascertain that the compound improves reproducibility.

12. The remaining claims are indefinite due to their dependence on an indefinite claim.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 1, 2, 7, 14, 17, 19, 21, 23-27, 34, 35-40, 41, 44, 46, 52, 55, 57, 59, 61-65, 71, 72, 80, 81-85, 87-92, 94-96, 98, 99, 110-115, 117-135, 137-140 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mirkin et al. [WO 00/41213] in view of Bernard et al. [US 2002/0098364].

With respect to claims 1, 139, Mirkin et al. teach a method comprising dip-pen nanolithography (i.e. direct-write lithography) by coating a scanning probe microscope tip with a patterning compound (i.e. providing a tip with a selected protein patterning compound; scanning probe microscope tip), wherein the compound can be a peptide or protein, and then bringing the coated tip into contact with a substrate to write a pattern (i.e. providing a substrate surface;

Art Unit: 1641

depositing the selected protein patterning compound from the tip to the substrate surface to produce a pattern) (p. 8, lines 20-32). Mirkin et al. further teach that the tip may be coated with an adhesion layer such that solvents adhere to the tip well (p.7, lines 5-10). Mirkin et al. fail to teach that the adhesion layer is a hydrophilic compound that also inhibits protein adsorption, such as polyethylene glycol.

Bernard et al., however, teach stamps that have been derivatized with polyethylene glycol (para. 0043), and further teach that these stamps are able to transfer a high amount of compounds such as a catalyst to a substrate even after being stored at ambient conditions for 21 days (para. 0045), while expanding the scope of applications by allowing many types of chemicals to be patterned on a large variety of substrates (para. 0007) reproducibly over days and weeks (para. 0087).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the tips of Mirkin et al. with a hydrophilic compound such as polyethylene glycol, which would also reduce protein adsorption, in order to be able to transfer a high amount of compounds to a substrate, while allowing many types of chemicals to be patterned on a large variety of substrates reproducibly over days and weeks.

15. With respect to claim 2, Bernard et al. teach that with hydrophilic stamps it is possible to print aqueous or polar compounds reproducibly over days and weeks (para. 0087).
16. With respect to claim 7, Bernard et al. teach coating with polyethylene glycol (para. 0043).
17. With respect to claim 14, Mirkin et al. teach a scanning probe microscope tip (p. 6, lines 15-21).

Art Unit: 1641

18. With respect to claims 17 and 19, Mirkin et al. disclose various substrates and patterning compounds comprising peptides and proteins capable of chemisorbing to the substrates (p.8, line 21 - p.9, line 32).
19. With respect to claims 21, 23-25, Mirkin et al. teach dot patterns comprising dots with 0.46 μ m diameter (p.21, lines 20-26).
20. With respect to claims 26, 27, Mirkin et al. teach using the tips to print a monolayer of peptides (p.9, lines 19-20), which would have a height of around 8 nm to 10 nm (the size of a protein).
21. With respect to claim 34, Mirkin et al. teach printing of compounds that can comprise both nucleic acids and proteins (p. 9, lines 8-10, 28-32).
22. With respect to claim 35, Mirkin et al. teach that the patterning compound is in a solution comprising a solvent that preferably adheres to the tip very well (p.13, lines 27-32).
23. With respect to claims 36, Mirkin et al. teach that the relative humidity affects the resolution of the lithographic process (p. 17, lines 13-18). Although Mirkin et al. fail to teach that the relative humidity is about 55% to 70%, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranged involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have had a relative humidity of about 55% to 70% to optimize the resolution of the lithographic process.

Art Unit: 1641

24. With respect to claim 37, Mirkin et al. teach a scanning probe microscope tip (p. 6, lines 15-21), which is an AFM tip. As discussed above, Bernard further teach derivatizing with polyethylene glycol (para. 0043), which is hydrophilic and thus electrostatically charged. With respect to claim 38, Mirkin et al. teach dot patterns comprising dots with 0.46 μ m diameter (p.21, lines 20-26).

With respect to claim 39, Mirkin et al. teach that the relative humidity affects the resolution of the lithographic process (p. 17, lines 13-18). Although Mirkin et al. fail to teach that the relative humidity is about 55% to 70%, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranged involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have had a relative humidity of about 55% to 70% to optimize the resolution of the lithographic process.

With respect to claims 40, 140, Mirkin et al. teach a method comprising dip-pen nanolithography (i.e. direct-write lithography) by coating a scanning probe microscope tip with a patterning compound (i.e. providing a tip with a selected protein patterning compound; scanning probe microscope tip), wherein the compound can be a peptide or protein, and then bringing the coated tip into contact with a substrate to write a pattern (i.e. providing a substrate surface; depositing the selected protein patterning compound from the tip to the substrate surface to produce a pattern) (p. 8, lines 20-32). Mirkin et al. further teach that the tip may be coated with an adhesion layer such that solvents adhere to the tip well (p.7, lines 5-10). Mirkin et al. fail to teach that the adhesion layer is a hydrophilic compound that also inhibits protein adsorption, such as polyethylene glycol.

Bernard et al., however, teach stamps that have been derivatized with polyethylene glycol (para. 0043), and further teach that these stamps are able to transfer a high amount of compounds such as a catalyst to a substrate even after being stored at ambient conditions for 21 days (para. 0045), while expanding the scope of applications by allowing many types of chemicals to be patterned on a large variety of substrates (para. 0007) reproducibly over days and weeks (para. 0087).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the tips of Mirkin et al. with a hydrophilic compound such as polyethylene glycol, which would also reduce protein adsorption, in order to be able to transfer a high amount of compounds to a substrate, while allowing many types of chemicals to be patterned on a large variety of substrates reproducibly over days and weeks.

25. With respect to claim 41, Bernard et al. teach that with hydrophilic stamps it is possible to print aqueous or polar compounds reproducibly over days and weeks (para. 0087).
26. With respect to claims 44, 46, Bernard et al. teach coating with polyethylene glycol (para. 0043), which is resistant to protein binding.
27. With respect to claim 52, Mirkin et al. teach a scanning probe microscope tip (p. 6, lines 15-21), which is an AFM tip.
28. With respect to claims 55, 57, Mirkin et al. disclose various substrates and patterning compounds comprising peptides and proteins capable of chemisorbing to the substrates (p.8, line 21 - p.9, line 32).
29. With respect to claims 59 and 61-63, Mirkin et al. teach dot patterns comprising dots with 0.46 μm diameter (p.21, lines 20-26).

30. With respect to claims 64-65, Mirkin et al. teach using the tips to print a monolayer of peptides (p.9, lines 19-20), which would have a height of around 8 nm to 10 nm (the size of a protein).
31. With respect to claims 71 and 72, Mirkin et al. teach printing of compounds that can comprise both nucleic acids and proteins (p. 9, lines 8-10, 28-32).
32. With respect to claim 80, Mirkin et al. teach patterning antibodies (p. 9, lines 30-32).
33. With respect to claim 81, Mirkin et al. teach that the patterning compound is in a solution comprising a solvent that preferably adheres to the tip very well (p.13, lines 27-32).
34. With respect to claims 82, 83, Mirkin et al. teach that the relative humidity affects the resolution of the lithographic process (p. 17, lines 13-18). Although Mirkin et al. fail to teach that the relative humidity is about 55% to 70%, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranged involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have had a relative humidity of about 55% to 70% to optimize the resolution of the lithographic process.
35. With respect to claims 84, 87, Mirkin et al. teach a scanning probe microscope tip (p. 6, lines 15-21), which is an AFM tip. As discussed above, Bernard further teach derivatizing with polyethylene glycol (para. 0043), which is hydrophilic and thus electrostatically charged.
36. With respect to claim 85, Mirkin et al. teach that the relative humidity affects the resolution of the lithographic process (p. 17, lines 13-18). Although Mirkin et al. fail to teach that the relative humidity is about 55% to 70%, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranged involves only

routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have had a relative humidity of about 55% to 70% to optimize the resolution of the lithographic process.

37. With respect to claims 88-89, Mirkin et al. teach that the relative humidity affects the resolution of the lithographic process (p. 17, lines 13-18). Although Mirkin et al. fail to teach that the relative humidity is about 55% to 70%, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranged involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have had a relative humidity of about 55% to 70% to optimize the resolution of the lithographic process.

38. With respect to claim 90, Mirkin et al. teach a method comprising dip-pen nanolithography (i.e. direct-write lithography) by coating a scanning probe microscope tip with a patterning compound (i.e. providing a tip with a selected protein patterning compound; scanning probe microscope tip), wherein the compound can be a peptide or protein, and then bringing the coated tip into contact with a substrate to write a pattern (i.e. providing a substrate surface; depositing the selected protein patterning compound from the tip to the substrate surface to produce a pattern) (p. 8, lines 20-32). Mirkin et al. further teach that the tip may be coated with an adhesion layer such that solvents adhere to the tip well (p.7, lines 5-10). Mirkin et al. fail to teach that the adhesion layer is a hydrophilic compound that also inhibits protein adsorption, such as polyethylene glycol.

Bernard et al., however, teach stamps that have been derivatized with polyethylene glycol (para. 0043), and further teach that these stamps are able to transfer a high amount of compounds

such as a catalyst to a substrate even after being stored at ambient conditions for 21 days (para. 0045), while expanding the scope of applications by allowing many types of chemicals to be patterned on a large variety of substrates (para. 0007) reproducibly over days and weeks (para. 0087).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the tips of Mirkin et al. with a hydrophilic compound such as polyethylene glycol, which would also reduce protein adsorption, in order to be able to transfer a high amount of compounds to a substrate, while allowing many types of chemicals to be patterned on a large variety of substrates reproducibly over days and weeks.

39. With respect to claim 91, Bernard et al. teach coating with polyethylene glycol (para. 0043), which is resistant to protein binding.

40. With respect to claims 92, 94, Mirkin et al. teach dot patterns comprising dots with 0.46 μm diameter (p.21, lines 20-26).

41. With respect to claims 95-96, Mirkin et al. teach using the tips to print a monolayer of peptides (p.9, lines 19-20), which would have a height of around 8 nm to 10 nm (the size of a protein).

42. With respect to claims 98, 99, Mirkin et al. teach dot patterns comprising dots with 0.46 μm diameter (p.21, lines 20-26). As discussed above, Bernard further teach derivatizing with polyethylene glycol (para. 0043), which is hydrophilic and resistant to protein adsorption.

43. With respect to claim 110, 111, Mirkin et al. teach a method comprising dip-pen nanolithography (i.e. direct-write lithography) by coating a scanning probe microscope tip with a

Art Unit: 1641

patternning compound (i.e. providing a tip with a selected protein patterning compound; scanning probe microscope tip), wherein the compound can be a peptide or protein, and then bringing the coated tip into contact with a substrate to write a pattern (i.e. providing a substrate surface; depositing the selected protein patterning compound from the tip to the substrate surface to produce a pattern) (p. 8, lines 20-32). Mirkin et al. further teach that the tip may be coated with an adhesion layer such that solvents adhere to the tip well (p.7, lines 5-10). Mirkin et al. fail to teach that the adhesion layer is a hydrophilic compound that also inhibits protein adsorption, such as polyethylene glycol.

Bernard et al., however, teach stamps that have been derivatized with polyethylene glycol (para. 0043), and further teach that these stamps are able to transfer a high amount of compounds such as a catalyst to a substrate even after being stored at ambient conditions for 21 days (para. 0045), while expanding the scope of applications by allowing many types of chemicals to be patterned on a large variety of substrates (para. 0007) reproducibly over days and weeks (para. 0087).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the tips of Mirkin et al. with a hydrophilic compound such as polyethylene glycol, which would also reduce protein adsorption, in order to be able to transfer a high amount of compounds to a substrate, while allowing many types of chemicals to be patterned on a large variety of substrates reproducibly over days and weeks.

44. With respect to claims 112, 113, Mirkin et al. teach further teach patterning of dot patterns comprising dots with 0.46 μm diameter and spacing of .54 μm (p.21, lines 20-26).

Art Unit: 1641

45. With respect to claim 114, Mirkin et al. teach further teach patterning of dot patterns comprising dots with 0.46 μm diameter and spacing of .54 μm (p.21, lines 20-26). Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranged involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention for the spacing to be less than 350 nm, in order to produce a more compact pattern.

46. With respect to claim 115, Mirkin et al. teach further teach patterning of dot patterns comprising dots with 0.46 μm diameter and spacing of .54 μm (p.21, lines 20-26).

47. With respect to claim 117, Mirkin et al. teach a scanning probe microscope tip (p. 6, lines 15-21), which is an AFM tip.

48. With respect to claims 118, 120-122, Mirkin et al. teach further teach patterning of dot patterns comprising dots with 0.46 μm diameter and spacing of .54 μm (p.21, lines 20-26).

49. With respect to claims 119, Mirkin et al. teach using the tips to print a monolayer of peptides (p.9, lines 19-20), which would have a height of around 8 nm to 10 nm (the size of a protein).

50. With respect to claim 123, Mirkin et al. teach printing an array of 25 dots in 20 seconds (p.21, lines 20-23)

51. With respect to claims 124-127, Mirkin et al. teach further teach patterning of dot patterns comprising dots with 0.46 μm diameter and spacing of .54 μm (p.21, lines 20-26).

52. With respect to claims 128, Mirkin et al. teach printing of compounds that can comprise both two different types of proteins, such as antibodies and enzymes (p. 9, lines 8-10, 28-32).

Art Unit: 1641

53. With respect to claims 129, Mirkin et al. teach using the tips to print a monolayer of peptides (p.9, lines 19-20), which would have a height of around 8 nm to 10 nm (the size of a protein).

54. With respect to claims 130-132, Mirkin et al. teach further teach patterning of dot patterns comprising dots with 0.46 μm diameter and spacing of .54 μm (p.21, lines 20-26). Mirkin et al. further teach using the tips to print a monolayer of peptides (p.9, lines 19-20), which would have a height of around 8 nm to 10 nm (the size of a protein). Furthermore, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranged involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention for the spacing to be less than 350 nm, 200 nm, or 100 nm, in order to produce a more compact pattern.

55. With respect to claim 133, Mirkin et al. teach printing an array of 25 dots in 20 seconds (p.21, lines 20-23). While Mirkin et al. fail to teach at least 85 dots, it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranged involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have an array of at least 85 dots, in order to maximize the number of proteins patterned and to obtain a clearer signal.

56. With respect to claims 134, Mirkin et al. teach using the tips to print a monolayer of peptides (p.9, lines 19-20), which would have a height of around 8 nm to 10 nm (the size of a protein).

Art Unit: 1641

57. With respect to claim 135, 137-138, Mirkin et al. teach printing of compounds that can comprise both two different types of proteins, such as antibodies and enzymes (p. 9, lines 8-10, 28-32). Mirkin et al. further teach patterning of dot patterns comprising dots with 0.46 µm diameter and spacing of .54 µm (p.21, lines 20-26). As a result, only the dots of the pattern would comprise the antibodies or enzymes.

58. Claim 97 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mirkin et al. [WO 00/41213] in view of Bernard et al. [US 2002/0098364], as applied to claim 90 above, and further in view of Duffy [US 2002/0028463].

The teachings of Mirkin et al. have been disclosed above and Mirkin et al. additionally teach AFM detection of immobilized substances (p. 3, line 29 – p. 4, line 2, Figure 2A). However, Mirkin fails to teach that the protein is labeled with a fluorophore to analyze the pattern.

Duffy, however, teaches that biomolecules immobilized on an array can be detected by detection techniques known in the art, including fluorescence detection and scanning probe microscopes such as AFM (para. 0113). The courts have ruled that art-recognized equivalence between embodiments provides a strong case of obviousness in substituting one material for another. See MPEP 2144.06:

In order to rely on equivalence as a rationale supporting an obviousness rejection, the equivalency must be recognized in the prior art, and cannot be based on applicant's disclosure or the mere fact that the components at issue are functional or mechanical equivalents. *In re Ruff*, 256 F.2d 590, 118 USPQ 340 (CCPA 1958) (The mere fact that components are claimed as members of a Markush group cannot be relied upon to establish the equivalency of these components. However, an applicant's expressed recognition of an art-recognized or obvious equivalent may be used to refute an argument that such equivalency does not exist.); *Smith v. Hayashi*, 209 USPQ 754 (Bd. of Pat. Inter. 1980) (The mere fact that phthalocyanine and selenium function as equivalent photoconductors in the claimed environment was not sufficient to establish that one would have been obvious over the other. However, there was evidence that both phthalocyanine and selenium were known photoconductors in the art of electrophotography).

Art Unit: 1641

"This, in our view, presents strong evidence of obviousness in substituting one for the other in an electrophotographic environment as a photoconductor." 209 USPQ at 759.).

Because Duffy teaches that fluorescence detection, which necessarily requires a fluorophore label, and scanning probe detection are recognized as equivalents applied for the same purpose, and Applicants have not provided evidence indicating why these two techniques cannot be considered art-recognized equivalents, it would have been obvious to one of ordinary skill in the art to substitute a fluorophore labeled protein for a non-labeled protein, so that the proteins pattern can be optically detected by one of ordinary skill in the art at the time of the invention, such as by fluorescence.

59. Claim 136 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mirkin et al. [WO 00/41213] in view of Bernard et al. [US 2002/0098364], as applied to claim 130 above, and further in view of Everhart et al. [US 2001/0004526].

The teachings of Mirkin et al. have been disclosed above, and Mirkin et al. further that the substrate can be any material, including metals such as gold (p.7, line 26 - page 8, line 20. Mirkin et al. fail to teach that the treatment is with a sulfur-containing compound.

Everhart et al., however, teach the step of placing a sulfur derivative as a blocker onto a substrate, in order to prevent non-specific binding on the substrate (para. 0037).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Mirkin et al. with the step of placing a sulfur derivative as a blocker onto a substrate, as taught by Everhart, in order to prevent non-specific binding on the substrate, thus allowing for more accurate assays with less nonspecific background noise.

Response to Arguments

60. Applicant's arguments with respect to claims 1, 2, 7, 14, 17, 19, 21, 23-27, 34-41, 44, 46, 52, 55, 57, 59, 61-65, 71, 72, 80-85, 87-92, 94-99, 110-115, 117-140 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

61. No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nelson Yang whose telephone number is (571)272-0826. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Long V. Le can be reached on (571)272-0823. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nelson Yang/
Patent Examiner, Art Unit 1641